
**स्थापना के लिए अभ्यास संहिता और
आउटडोर का रखरखाव पावर लाइन
कैरियर उपकरण**

भाग 1 लाइन ट्रैप

(पहला पुनरीक्षण)

**Code of Practice for Installation and
Maintenance of Outdoor Power Line
Carrier Equipment**

Part 1 Line Traps

(First Revision)

ICS 33.200

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फ़र मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002

www.bis.gov.inwww.standardsbis.in

FOREWORD

This Indian Standard (Part 1) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Power Systems Control and Associated Communications Sectional Committee had been approved by the Electronics and Information Technology Division Council.

The standard was originally published in 1982. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards. In addition, the following changes have been made:

- a) Clause **4.2** — Reference to *The Electricity Act*, 2003 and Central Electricity Authority (Measures relating to safety and Electricity Supply) Regulations, 2018 has been provided.

This standard is intended to serve as a guide to installation engineers, contractors and users of power line carrier equipment, as far as line traps are concerned.

In view of the consideration that this code is required to be in conformity with the prevailing practice in India, considerable assistance has been derived from *The Electricity Act*, 2003 and Central Electricity Authority (Measures relating to safety and Electricity supply) Regulations, 2018 while drafting this standard. Reference to the relevant provisions of the electricity rules, 2005 has therefore, been made at appropriate places with a view to bringing to the notice of the installation and/or maintenance engineer(s) the statutory regulations concerning this work.

This standard cover installation and maintenance of line traps. The following are the other parts of this standard:

- Part 2 Coupling devices
- Part 3 Coupling capacitors/CVT

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CODE OF PRACTICE FOR INSTALLATION AND MAINTENANCE OF OUTDOOR POWER LINE CARRIER EQUIPMENT

PART 1 LINE TRAPS

(First Revision)

1 SCOPE

This Standard (Part 1) covers installation and maintenance of line traps generally used in outdoor installations.

2 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 8792 shall apply.

3 EXCHANGE OF INFORMATION

3.1 Before ordering the line traps, information should be exchanged between the owner, switchyard designer, transmission line designer, installation engineer, maintenance engineer and manufacturer, so that the line trap is procured to suit the duty, location and installation conditions under which the line trap will operate.

3.2 The engineer should obtain well in advance all relevant information about the overall dimensions, weight for transport, installation, etc., of the line trap. When the main coil, tuning device, bird barrier and protective device are packed separately, a packing list and drawings showing the assembly shall be supplied to the user.

4 GENERAL REQUIREMENTS

4.1 The manufacturer shall provide drawings and instructions for the installation and maintenance of the line trap well in advance of the delivery. It is essential that the installation of the line trap as well as its maintenance are performed in accordance with the instructions given by the manufacturer.

4.2 All electrical installations shall comply with the requirements of *The Electricity Act 2003* and Central Electricity Authority (measures relating to safety and electricity supply) regulations, 2018 made there under.

4.3 If considered necessary, the local authorities concerned in the administration of the Rules and Regulations in the manner of layout of installation shall be consulted in regard to the Rules and Regulations that may be applicable.

4.4 The installation shall be carried out only by authorized persons competent to undertake such work under the Rules and Regulations that may be in force in different states.

5 INSTALLATION DESIGN

5.1 General

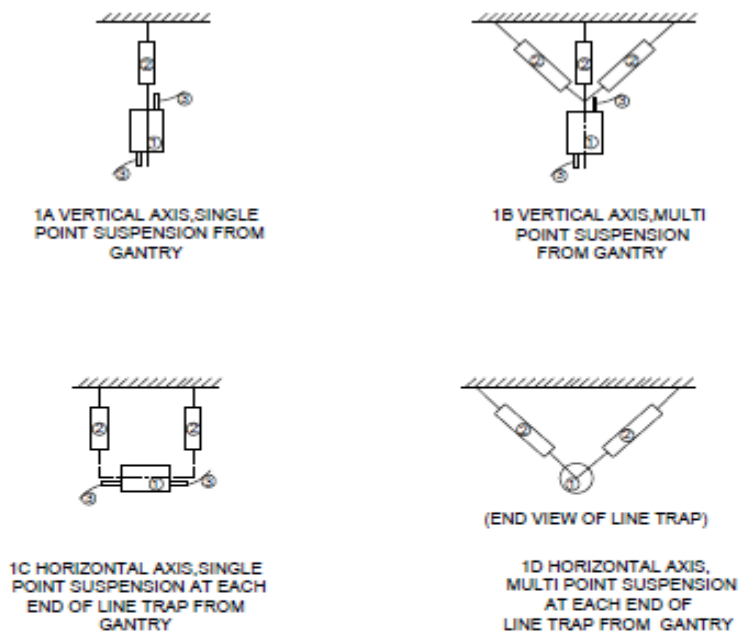
The installation shall be done in such a manner that maximum safety to operational and maintenance personnel is assured.

5.2 Arrangement

5.2.1 The following are the basic ways of installing line traps:

- a) Suspension
 - 1) Vertical axis, single point suspension from the gantry (*see Fig. 1 A*);
 - 2) Vertical axis, multipoint suspension from the gantry (*see Fig. 1 B*);
 - 3) Horizontal axis, single point suspension at each end of the line trap from the gantry (*see Fig. 1 C*);
 - 4) Horizontal axis, multipoint suspension at each end of the line trap from the gantry (*see Fig. 1 D*); and
 - 5) Vertical axis, suspension from the transmission line.

NOTE — The arrangement at (5) may be adopted only when other alternatives given above are not feasible



- (1) Line Trap
- (2) Strain Insulator String
- (3) Current Carrying Conductor

FIG.1 TYPICAL METHODS OF SUSPENSION OP LINE TRAPS

b) Supported

- 1) Vertical axis, supported by a coupling capacitor/CVT (see Fig. 2A);
- 2) Vertical axis, supported by a single insulator stack on a structure (see Fig. 2B);
- 3) Vertical axis, supported on three or more insulator stacks on a structure (see Fig. 2C); and
- 4) Horizontal axis, supported by one insulator stack at each end of the line trap on a structure (see Fig. 2D).

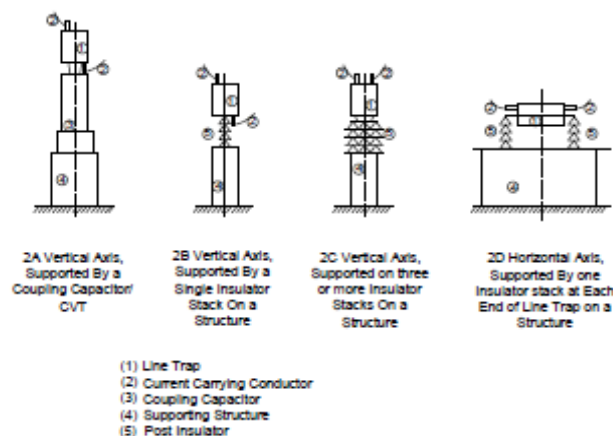


FIG.2 TYPICAL METHODS OF SUPPORTING LINE TRAPS

c) Suspended and Supported

- 1) Two line traps suspended one below the other;
- 2) One-line trap suspended from the transmission line and the other from the gantry [see NOTE under 5.2.1 (a) (5)]; and
- 3) One-line trap mounted on coupling capacitor/CVT and the other suspended from gantry or transmission line [see NOTE under 5.2.1 (a) (5)].

5.2.2 The method of installation to be adopted shall depend on the following factors:

- a) Whether the power line is a transmission line or a power cable. (If the power line is a cable, a gantry for suspending the line trap may not be available);
- b) Geometry of the line trap;
- c) Mechanical forces (such as, weight, wind force and forces due to short circuit);
- d) Availability of space in the switch yard; and
- e) Electrical clearances.

5.2.3 Before deciding on a particular method of installation of the line trap, it should be verified from the manufacturer that the method can be adopted.

5.2.4 The following guidelines may be used:

- a) Mounting the line trap on top of a coupling capacitor or GVT shall normally be considered only with the specific approval of the manufacturer of the coupling capacitor or CVT;
- b) Line traps having a diameter larger than 1 m shall preferably be supported by three or more insulator stacks, symmetrically placed;
- c) In EHV applications, where suspension insulator strings are long, it is preferable to use two or more strings in 'Vee' formation, in order to reduce swinging; and
- d) Non-magnetic separation between the support/suspension and the line trap may be necessary in certain cases. This should be checked with the manufacturer.

5.3 Electrical Connections to the Line Trap

5.3.1 General

Depending on the type of application required, the electrical connections to the line trap may be line conductors, cables or bus bars.

5.3.2 In a majority of applications, the connections are made to the transmission line conductor. The conductor should not be mechanically loaded by the

weight of the line trap similarly; the line should not exert a pull on the line trap.

5.3.3 Connectors of appropriate material shall be used depending on the material of line/jumper conductors and material of line traps/terminals.

5.3.4 Clamps and connectors for ACSR conductor to the line trap shall preferably be of compression type.

5.3.5 Manufacturers generally provide alternative positions and types of terminals depending upon the type of installation, an optimum choice of terminals may be made.

5.4 Clearances

All parts of the line trap are considered live and therefore minimum clearances between the line trap and other phases and between line trap and earth should be maintained in all conditions. Due allowances should be given to take care of conductor movements and sagging in worst conditions the recommended clearances are given in Table 1.

5.5 Rating of Line Traps

The rating of the line trap shall normally be influenced by the following:

- a) The actual continuous current carrying capacity of the transmission line or the required short time current/dynamic current capacity corresponding to the station bus fault level, whichever is higher;
- b) The ambient temperature and elevation above mean sea level;
- c) Blocking bandwidth; and
- d) Blocking impedance in the band (which in turn takes into account the characteristic impedance of the line or power cable, the type of coupling, etc.)

6 INSTALLATION

6.1 Some manufacturers supply the main coil, tuning device and protective device separately. Before installing the line trap, it should be checked that the tuning device and the protective device are assembled and connected properly. The details of the tuning device and the line trap should be properly recorded, preferably on a name-plate fixed to the nearby structure, preferably the associated coupling capacitor/CVT.

Table 1 Minimum Electrical Clearances
(Clause 5.4)

System Rating	Voltage (Highest System Voltage)	Impulse Withstand Level	Minimum Clearance Between Phase and Earth	Minimum Clearance Between Phases	Minimum Clearance from any point where the man may be required to stand to the nearest unscreened Conductor in air (Sectional Clearance)
	kV (rms) (1)	kV (peak) (2)	mm (3)	mm (4)	m (5)
	12	60 (List 1) 75 (List 2)	90 120	90 120	- -
	36	145 (List 1) 170 (List 2)	- 320	270 320	- 3
	72.5	325	630	630	3.5
	123	450 550	900 1100	900 1100	3.5 4
	145	450 550 650	900 1 100 1 300	900 1 100 1 300	3.5 4 4
	245	650 750 850 950 1 050	1 300 1 500 1 600 1 900 2 400	1 300 1 500 1 700 1 900 2100	4 - 4.5 4.5 5

NOTE — The values for system voltage rating of 400 kV are under consideration.

- 6.2** The line trap shall be carefully handled to avoid damage or breakage; the tuning device and protective device are likely to get damaged, if not handled carefully.
- 6.3** Slings shall be carried out only at the lugs provided for it.
- 6.4** Where bus bars are used for connections, joints should be either tinned, silver plated or should have a small coating of any conducting grease to ensure good contact. For bi metallic joints, no tinning or plating should be resorted to.

7 MAINTENANCE

7.1 Routine Maintenance

Line traps do not require much maintenance. However, whenever the line outage is taken, preferably the line trap may be physically inspected for loose connections, and tuning device and protective device may be cleaned. Bird nests or beehives inside the main coil may be replaced. The tuning device shall be closely inspected and replaced if it shows signs of damage.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402

Website: www.bis.gov.in

Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower -1, 6 th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	{ 2821 8093

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